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Instrument chirurgical coupant

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Descripti n

Technical Field

[0001] This application relat s to a surgical cutting instrument, and more particularly to a surgical cutting instrument having a chamber for storing the cut tissue portions. Such an instrument is disclosed in DE-U-85 18 482.9 on which the pre-characterizing part of claim 1, below, is based.

Background of Related Art

[0002] Surgical instruments for cutting body tissue are well known. One type of instrument has a pair of scissors type jaws in which either both jaws move or one jaw moves relative to the other fixed jaw in a scissors like fashion, i.e. at an angle to the longitudinal axis of the instrument. An example of this scissors type instrument is disclosed in U.S. Patent No. 4,994,024 to Falk. Another type of cutting instrument, especially useful in orthopedic procedures for cutting hard tissue or bone, has a cutting blade which is slidable longitudinally in either a distal or proximal direction to sever the body portion. Examples of this type of instrument are disclosed in U. S. Patent No. 5,106,364 to Hayafuji et al. , U.S. Patent No. 4,850,354 to McGurk-Burleson et al., U.S. Patent No. 5,226,910 to Kajiyama et al., and U.S. Patent NO. 4,282,884 to Boebel.

[0003] It is also recognized that as these cutting instruments dissect the body tissue, it is advantageous to remove the tissue portions as they are dissected or to store the dissected tissue portions in the instrument. This is especially the case in endoscopic surgical procedures. Endoscopic (minimally invasive) surgical procedures are performed under visualization through either small access ports or directly through small incisions in the body. Therefore, if the dissected body tissue is not removed as it is dissected, the instrument needs to be withdrawn from the surgical site each time a tissue portion is cut, the tissue portion needs to be manually removed from the instrument, and then the instrument needs to be reinserted to the surgical site. These steps need to be repeated until the entire tissue section is removed. This repeated re-insertion of the instrument can be very time consuming, and therefore more expensive, especially in endoscopic procedures, because the surgery is being performed at a remote surgical site. The repeated insertion can also cause complications in endoscopic procedures where access to the surgical site is difficult such as in endoscopic discectomy.

[0004] As noted above, the advantages attendant removing or storing the dissected body tissue portions are well known. One way of continuously removing the tissu portion as it is dissect d is by utilizing suction. On example of th us of suction is disclosed in U.S. Patent No. 4,589,414 to Yoshida et al. In Yoshida, a cutting member slides longitudinally in a distal direction to cut body tissue position d in th opening in th instrument and th cut tissu is withdrawn through a suction channel in the inn r tub . U.S. Pat nt No. 5,007,917 to Evans discloses a rotatabl cutting blad for cutting tissu and a suction tube for removing the tissu . Th aforementioned patent to Falk discloses a vacuum extraction channel for use with a scissors type cutting instrument.

[0005] U.S. Patent No. 4,282,884 to Boebel, identified above, has a storage chamber for the cut tissue. The punch assembly is slid in a proximal direction, and the punched out tissue portion is pressed into a tubular receiver member and stored therein. At the end of the procedure, the tissue portions can be removed from the receiver member.

[0006] The need exists for an improved cutting instrument for storing dissected tissue portions for removal at the end of the procedure. Such instrument would advantageously be configured to force the tissue sections into the storage chamber to prevent clogging and allow for maximum use of the space in the chamber. The instrument would also advantageously enable easy access and removal of the tisse sections at the end of the procedure.

SUMMARY

[0007] The present invention is defined in claim 1, below. A surgical apparatus for cutting and storing sections of body tissue is provided comprising a housing having a handle assembly, an elongated outer tube extending from the handle assembly, and a cutting tube positioned within the outer tube and movable in response to actuation of the handle assembly between a retracted position and a distal position to cut body tissue. The cutting tube has a chamber formed therein for storing the cut tissue sections. An anvil may be positioned at a distal end of the outer tube for forcing each cut tissue section proximally into the chamber of the cutting tube as the cutting tube is advanced to cut the body tissue. The outer tube preferably has a window at a distal end to receive the body tissue and the anvil is positioned distally of the window.

[0008] A plug assembly is mounted at the proximal end of the cutting tube and is removable therefrom after the cutting tube is removed from the outer tube to access the cut tissue sections.

[0009] The plug assembly preferably includes a plug and a retaining member having a pair of ears extending into a pair of notches in the cutting tube such that pulling on the plug when the cutting tube is positioned within the outer tube cams the ears further into engagement with the notches to prevent removal of the plug.

[0010] The handle assembly preferably includes a trigger movable from a first position to a second position to advance th cutting tub and furth r movable to a r - leas position to enabl r l ase of th cutting tub . A rel ase lever may b provid d which is ngagabl with the trigger and movabl from a first ngag d position to

a releas position to nabl th trigger to move to its rel ase position to enabl removal of the cutting tub from the outer tub .

[0011] In a pref rr d embodiment, a rotating knob rotat s the elongat d body portion i.e., th out r tube and cutting tube, about its longitudinal axis. A locking member may also be provided which is engagable with the rotating knob to prevent rotation thereof.

BRIEF DESCRIPTION OF THE DRAWINGS:

[0012] Various embodiments are described herein with reference to the drawings, wherein:

Fig. 1 is a perspective view showing the surgical cutting apparatus with the cutting tube in the retracted position;

Fig. 1A is an enlarged cross-sectional view taken along lines 1A-1A of Fig. 1 showing the engagement of the locking button with the rotation knob to prevent rotation of the outer tube;

Fig. 2 is a perspective view of the apparatus of Fig. 1 showing the locking button in the release position and rotation of the outer tube;

Fig. 2A is an enlarged cross-sectional view taken along lines 2A-2A of Fig. 2 illustrating the locking button in the release position disengaged from the rotation knob;

Fig. 3 is an exploded perspective view of the apparatus of Fig. 1;

Fig. 3A is an exploded perspective view of an alternate embodiment of the mechanism for locking the rotation knob;

Fig. 4 is a cross-sectional view taken along lines 4-4 of Fig. 1 showing the trigger in the initial position and the cutting tube in the retracted position;

Fig. 4A is a cross-sectional view taken along lines 4A-4A of Fig. 1 showing the cutting tube in the retracted position;

Fig. 4B is an enlarged perspective view of the distal end of the apparatus of Fig. 1 showing the cutting tube retracted inside the outer tube;

Fig. 5 is an enlarged side view in partial cross-section of a portion of the plug assembly;

Fig. 5A is an enlarged exploded perspective view of the plug assembly;

Fig. 6 is a cross-sectional view similar to Fig. 4 showing the trigger in the proximal position and the cutting tube in the advanced (distal) position to cut body tissue;

Fig. 6A is a cross-sectional view similar to Fig. 4A showing the cutting tube in the advanced position;

Fig. 6B is an enlarged perspective view of the distal end of the apparatus of Fig. 1 showing the cutting tube in the advanc d position to cut body tissue;

Fig. 7 is an nlarg d cross-sectional view corresponding to the position of th trigg r and cutting tube in Fig. 6;

Fig. 7A is an enlarg d cross-sectional view corresponding to th position of th trigg r and cutting tube when th trigger is mov d to th release position;

Fig. 8 is a cross-sectional view similar to Fig. 4 showing the release lever in the release position, the trigger in the distal release position and the plug assembly being pulled rearwardly to remove the cutting tube;

Fig. 9 is a side view in partial cross-section illustrating grasping of the plug to remove the cutting tube and plug assembly from the outer tube;

Fig. 10 is a side view in partial cross-section illustrating grasping of the plug retainer to remove the plug assembly from the cutting tube;

Fig. 11 is a side view illustrating removal of the plug assembly from the cutting tube;

Fig. 12 is a side view showing the direction of insertion of the plunger into the cutting tube to remove the tissue sections contained therein; and

Fig. 13 is a side view showing the plunger inserted into the cutting tube to force the tissue sections out of the distal end.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS:

[0013] Referring now to the drawings and in particular to Figs. 1 and 1A, the surgical apparatus, designated generally by reference numeral 10, is illustrated for cutting body tissue. The apparatus has an elongated outer tube or endoscopic portion 14 extending from housing or handle assembly 12. Outer tube 14 is dimensioned and configured for either insertion through a trocar cannula or through a small incision in the body tissue. Slidably positioned within outer tube 14 is an elongated hollow inner cutting tube 16. Cutting tube 16 is advanced distally upon actuation of handle assembly 12 to cut body tissue positioned in window 61 of outer tube 14. An anvil 66, positioned at a distal end of the outer tube 14, forces the severed body tissue portion rearwardly inside the cutting tube 16. In this manner, the apparatus can be inserted inside the body and the cutting tube 16 repeatedly advanced to cut body tissue with the anvil 66 forcing the cut tissue sections proximally inside the cutting tube to enable storage of a plurality of tissue portions. The cutting tube 16 can subsequently be easily separated from the apparatus to access and remove the individual tissue sections stored therein. This is achieved by removal of the plug assembly, which includes a plug 92 and a plug retainer 90, from the proximal end of cutting tube 16 in the manner described below.

[0014] A release lever 42 is mounted on the handle assembly 12 and cooperates with th trigger 40 to enabl movement of the trigger 40 to a r l as position so th cutting tub 16 can be remov d from the apparatus. The release lev r 42 is shown in Fig. 1 in th engaged

(blocking) position. Also shown in Figur 1 is rotation knob 20 for rotating th out r tub 14 (and inner cutting tube 16) about its longitudinal axis. A locking button 22 is engagabl with th rotation knob 20 to lock th knob 20 and prev nt rotation of the tubes 14, 16. Th locking button 22 and the releas lev r 42 ar discuss d in detail below.

[0015] Turning now to the individual components of the apparatus 10, and first to the handle assembly 12 as illustrated in Figs. 1 and 3, handle assembly 12 is composed of two housing halves 12a, 12b welded together or attached by other known methods. Trigger 40 is pivotably mounted to housing halves 12a, 12b via mounting pin 41 extending through opening 46. Trigger 40 is movable between three positions. In the first (initial) position shown in Fig. 4, the cutting tube 16 is in the retracted position. In the second position as shown in Fig. 6, trigger 40 is moved towards stationary grip 48 to advance the cutting tube 16 distally. In the third position, trigger 40 is moved to a distal release position shown in Fig. 8 which enables the cutting tube 16 to be withdrawn from the outer tube 14 in the manner described below.

[0016] In the initial position of trigger 40, spaced apart projecting fingers 43 engage rod portion 89 of the plug assembly, which is mounted to the cutting tube 16, such that proximal (counterclockwise) movement of trigger 40 in the direction of the arrow of Fig. 6, slides cutting tube 16 distally to cut the tissue positioned in window 61 (Fig. 6A).

[0017] Trigger 40 is normally biased to the third position by extension spring 50; however it is prevented from moving to this position by lever mounting shank 56 when release lever 42 is in the blocking position. Therefore, when release lever 42 is in its normal blocking position of Fig. 4, trigger 40 is essentially biased by extension spring 50 to the first position. When release lever 42 is pivoted to its release position of Fig. 8, trigger 40 is no longer blocked and can spring forward to its third position. As shown in Fig. 4, one end of extension spring 50 is mounted on post 31 of stationary grip 48 and the other end extends through aperture 38 in trigger 40. Stop 45 limits the pivotal movement of trigger 40.

[0018] The release lever 42 blocks movement of trigger 40 due to mounting shank 56. Mounting shank 56 extends through opening 33 in handle housing half 12a. Torsion spring 59 biases lever 42 to the trigger blocking position shown in Figs. 4 and 6. In this blocking position, trigger 40 is prevented from moving to its distal position by mounting shank 56 because trigger notch 52 of trigger 40 abuts curved surface 56b of shank 56. This prevents the removal of cutting tube 16 from outer tube 14 since projecting fingers 43 remain engaged in rod portion 89 of the plug assembly. When release lever 42 is pivoted to its upward release position as shown in Fig. 8, trigger notch 52 can bypass mounting shank 56 due to th alignm nt of flat 56a of mounting shank 56 with surface 52a of notch 52. Consequ ntly, trigger 40 springs forward to the release position so that projecting fingers 43 are out of ngag ment with th plug assembly to allow removal of th cutting tub 16.

[0019] Turning now the outer tub 14 and with refer- nc to Figs. 1, 3 and 4, out r tub 14 has an open distal end 60 to mount anvil (tissu ngaging member) 66, a window 61 to receive the body tissue to be cut, and a proximal end portion 62 positioned within longitudinal recess 36 formed by housing halves 12a, 12b. Lip 65 helps retain outer tube 14 in handle assembly 12. Central bore 64 of outer tube 16 is dimensioned to slidably receive cutting tube 16. A cylindrically shaped seal 67 is positioned inside the outer tube 14 and surrounds the cutting tube 16 to restrict the egress of gas through the gap between the outer tube 14 and cutting tube 16 if the body cavity is insufflated during the procedure. Clearly, other types of seals to restrict gas flow are also contemplated.

[0020] The outside diameter of the outer tube 14 is preferably about 10 mm and preferably is tapered as shown at portion 63 to an outside diameter of about 5 mm, although other dimensions are clearly contemplated. Anvil 66 is mounted at distal end 60 of outer tube 14 via dovetail fitting 66a (Fig. 4B) and has an angled surface 68 corresponding to the angled distal tip 75 of outer tube 12 (see Figs. 4A and 4B). The angled distal tip 75 facilitates manipulation and use of the apparatus as it can more readily be hooked behind the target tissue. Angled surface 68 of anvil 66 also has a straight portion 68a which helps force the cut tissue sections proximally into cutting tube 16 when the cutting tube 16 is advanced. Angled surface 68 preferably forms an angle with respect to the central longitudinal axis of outer tube 14 ranging from approximately 90 degrees to about 140 degrees, and preferably an angle R of 130 degrees. Alternatively, other angles, such as a 90 degrees angle can be utilized.

[0021] An orientation plate 70 is positioned within outer tube 12 and extends through slots 72 to sit within cavity 37 of handle assembly 12. D-shaped central opening 74 is dimensioned to receive cutting tube 16 therethrough.

[0022] Cutting tube 16, as shown in Figs. 3, 4, 4A and 4B has an open proximal end 80 and an open distal end 82. The distal end 82 is shown having a circumferential straight cutting edge, however alternately an angled edge can be provided either integrally formed with the cutting tube 16 or a separate element attached thereto. A plurality of cutting teeth can also alternatively be provided. The cutting tube 16 has an axial bore 86 extending the length thereof which forms a chamber for storing the individual tissue portions as they are cut. Anvil 66 forces the cut tissue sections rearwardly into axial bore 86 to create space in the cutting tube 16 for receiving the next cut tissue section when cutting tube 16 is once again advanc d to cut tissu .

[0023] Cutting tube 16 has a flattened bottom surface 81 which sits on the flat bottom surface of D-shap d opening 74 of orientation plat 70. This pr v nts lateral

mov ment and rotation of th cutting tube as well as aligns th cutting tube 16 inside out r tube 14.

[0024] R f rring to Figs. 3, 4, 5 and 5A, plug ass mbly (nd cap ass mbly) is mount d on the proximal nd 80 of cutting tub 16 and includes a plug 92 and a plug retain r 90 for preventing r moval of plug 92. Plug retain r 90 is seated in the proximal portion of axial bore 86, is spring biased distally by compression spring 101 mounted on tubular portion 117 of plug 92, and has a pair of spaced apart ears 94 seated in a pair of notches 96 formed in the cutting tube 16. Ears 94 are supported by shank 103 which has an outer diameter almost equal to the inner diameter of the cutting tube 16 to enable frictional engagement of shank 103 and cutting tube 16 to stabilize the cutting tube 16. The proximal end of cutting tube 16 abuts surface 107 of cylindrical portion 113 of plug retainer 90. Proximal extensions 116 are seated within recesses 118 formed in a head portion 112 of plug 92.

[0025] Plug 92 has a knurled gripping surface 98 at its proximal end and a cam nose 99 at its distal end. O-ring 97 is seated in a circumferential recess of cam nose 99 to provide a seal to prevent the egress of insufflation gas through the cutting tube 16 if the apparatus is used in a procedure performed under insufflation. Other seals can also be utilized. In the initial position, notches 111 of ears 94 rest on camming surface 105 of camming nose 99 and the ears 94 extend through notches 96 of cutting tube 16 to connect the plug assembly to the cutting tube 16. This is best shown in Fig. 4. If the plug 92 is gripped by its knurled surface 98 and pulled proximally, cam nose 99 will be pulled proximally between ears 94 to enable camming surface 105 to cam the ears 94 further outwardly into locking engagement with notches 96 of cutting tube 16 as shown in Fig. 8 and 9. This enables the cutting tube 16 to be removed. Note that this locking engagement prevents removal of plug 92 from cutting tube 16 if knurled surface 98 is pulled. Thus, the ears also function to provide a locking device to prevent inadvertent disengagement of the plug assembly from the cutting tube 16.

[0026] The plug assembly can be removed from cutting tube 16 to access the tissue stored therein only when knurled gripping surface 91 of the plug retainer 90 can be grasped. This occurs only when the release lever 42 has been rotated to its release position to disengage the projecting fingers 43 of trigger 40 from rod portion 89, and the cutting tube 16 is withdrawn from the outer tube 14 as shown in Fig. 10. Only when this occurs can knurled surface 91 be accessed. When plug retainer 90 is pulled proximally in the direction of the arrow, the ears 94 can slide out of notches 96 as camming release surfaces 108 are forced inwardly by the wall 115 of cutting tube 16 adjacent the notches 96 and plug retainer 90 (and attached plug 92) can be removed from the outer tub 14 as shown in Fig. 11. The tissue sections T can th n be r moved and organized for pathology.

[0027] As best shown in Fig. 7, recess 93 in th plug assembly is configured to r ceive d tent spher 85 wh n the trigg r 40 is in th releas position. Sphere 85 is s ated within recess 83 in housing half 12b and is spring biased by compression spring 87 to snap into n-gagement with recess 93 in plug r tain r 90 to prevent the cutting tube 16 from slipping out of outer tube 14 when the trigger 40 is in the release position (see Fig 7A). This engagement also provides a tactile feel to the user that the cutting tube 16 is released for withdrawal from outer tube 14 as well as when the cutting tube 16 has been properly reinserted into the outer tube 14 of the apparatus.

[0028] Turning now to the rotation knob 40 and with reference to Figs. 1 and 3, as mentioned above, rotation knob 20 extends through cutout 34 in housing halves 12a, 12b and is mounted to outer tube 14 to rotate outer tube 14 about its longitudinal axis. Rotation of outer tube 14 causes rotation of cutting tube 16 due to orientation plate 70 which rotates with outer tube 14. Leg 22a of rotation locking button 22 is seated within recess 23 of mounting block 25, slidably mounted on handle assembly 12, and spring biased to the locking position by spring 30. Locking button 22 is shown in Figs. 1 and 1A in the locking position. In this locking position, the pair of locking fingers 24 of mounting block 25 engage a pair of recesses 26 in rotation knob 20 to thereby prevent rotation of knob 20. When it is desired to rotate outer tube 14 to change the orientation of the window 61, locking button 22 is slid proximally in the direction of the arrows of Figs. 2 and 2A. This slides mounting block 25 proximally to release the locking fingers 24 from recesses 26 and allow free rotation of rotation knob 20. When locking button 22 is released by the user, it springs back into the locking position under the biasing force of spring 30.

[0029] An alternate embodiment of a rotation knob locking mechanism is shown in Fig. 3A. Locking button 122 has a mounting leg 123 seated within recess 126 in locking plate 124. Locking plate 124 has a single integral extension 125 which engages a single recess in the rotation knob to prevent rotation.

[0030] In operation, with reference initially to Figs. 4, 4A and 4B, trigger 40 is initially spaced from stationary grip 48 with projecting fingers 43 engaging rod portion 89 of plug 92. As shown, cutting tube 16 is in the proximal (retracted) position and release lever 42 is in the blocking position parallel to the longitudinal axis of the tubes 14, 16.

[0031] The apparatus is inserted into the body, either through a cannula or directly through a small incision, and the outer tube 14 is placed adjacent the surgical site such that the tissue to be severed is seated within window 61. If the user needs to re-orient the window 61, locking button 22 is slid proximally to disengage locking fingers 24 from th recesses 26 in th rotation knob 20. Locking button 22 is h ld by the user in this proximal position and the rotation knob is turn d to rotat outer tube 14 (and window 61) to the d sir d position. Onc

the tissu is prop rly seat d, trigger 40 is actuated by sque zing it towards stationary grip 48 to advance cutting tube 16 distally towards anvil 66 as shown in Figs. 6, 6A and 6B. The cutting edge of the cutting tub 16 passes through th window 61 to pierc and dissect the body tissue seated therein. As the cutting tube 16 passes over anvil 66, angled surface 68 and straight surface 68a enter the hollow interior of the cutting tube 16, and force the dissected tissue proximally into the cutting tube 16. After dissection, trigger 40 is released, returning cutting tube 16 to the proximal position of Fig. 4A. Note that plug 92 cannot be removed from the cutting tube 16 due to the engagement of ears 94 with the notches 96 of cutting tube 16.

[0032] The user can then once again squeeze trigger 40 to advance cutting tube 16 to dissect another portion of the body tissue positioned in window 61. As the cutting tube 16 advances to its distalmost position, anvil 66 once again forces the dissected tissue rearwardly (proximally) into cutting tube 16. The cutting tube 16 can be repeatedly advanced and retracted in this manner to dissect the entire desired portion of body tissue, with the anvil 66 advantageously forcing the body tissue sections proximally to provide room for the next body tissue portion. Fig. 9 illustrates a plurality of body tissue sections T positioned within cutting tube 16.

[0033] Note that when trigger 40 and cutting tube 16 are in the position of Figs 4 and 4A, the cutting tube 16 cannot be removed from outer tube 14. If the user grasps gripping surface 98 of plug 92 in an attempt to remove cutting tube 16, projecting fingers 43 of trigger 40 will block removal of the cutting tube 16. Also in the position of Figs. 4 and 4A, the plug 92 cannot be removed from the cutting tube 16 because ears 94 engage notches 96 of cutting tube 16 and if the user pulls on gripping surface 98, the camming nose 99 of plug 92 will cam the ears further into engagement with notches 96.

[0034] After use, to remove the tissue from the chamber 86 of cutting tube 16, release lever 42 is rotated counterclockwise to the position of Fig. 8 so that flat 56a of mounting shank 56 is in alignment with surface 52a of trigger notch 52. Consequently, notch 52 rides over mounting shank 56 to allow trigger 40 to spring forward to its distal release position under the force of extension spring 50. In this distal release position, the projecting fingers 43 are disengaged from notch 89 in the plug 92. Thus, when the user grasps gripping surface 98 of plug 92 and pulls proximally, the entire cutting tube 16 is withdrawn from the outer tube 14 through the opening in proximal end 62 as the ears 94 of plug retainer 92 engage notches 96 in cutting tube 16.

[0035] After the cutting tube 16 has been removed as shown in Fig. 9, to access the tissue portions, gripping surface 91 of plug retainer 90 is grasped and pulled proximally (Fig. 10). This removes the plug 92 and plug retainer 90 fr m cutting tube 16 since th ears 94 ar cammed closed by wall 115 adjacent notches 96 so they can slid out of notches 96. Fig. 11 illustrat s th plug assembly separated from the cutting tub 16. Th tissue s ctions T can th n b r moved from cutting tub 16 and arranged in a manner similar to their configuration prior to dissection to assist in xamination and testing of the tissu . Figs. 12 and 13 illustrate one method of removing the tissue sections T in which plunger 100 is inserted through the open proximal end 80 of cutting tube 16 to force the tissue sections out of the open distal end 82.

[0036] For subsequent use of the instrument, cutting tube 16 is inserted through the opening in proximal end 62 of outer tube 14 until the user feels the engagement of detent sphere 85 with recess 93 as in Fig. 7A. Trigger 40 is then squeezed towards stationary grip 48, causing release lever 42 to rotate clockwise over center, under the force of torsion spring 59, to its original position of Fig. 4 enabling projecting fingers 43 to engage rod portion 89 of plug 92. The cutting tube 16 can then be actuated by squeezing trigger 40 in the manner described below for reuse.

[0037] The apparatus can be entirely disposable and can be discarded after use. It can also be partially disposable with some parts discarded e.g. the cutting tube and plug assembly, and the remaining parts, e.g. the handle assembly, reused. Alternatively, the apparatus can be composed of suitable materials to enable re-sterilization of the instrument parts for subsequent reassembly and reuse. The apparatus 10 can be packaged in a kit with several cutting tubes (and plug assemblies).

[0038] The instrument 10 can be used to dissect tissue in a variety of surgical procedures. For example, in endoscopic discectomy procedures, the instrument can be inserted into the disc space to quickly dissect portions of the disc. The cutting tube can then be removed in the manner described above and the tissue sections removed and analyzed. The instrument can also be used as a ronguer for cutting and storing sections of bones in other surgical procedures.

[0039] It will be understood that various modifications may be made to the embodiments disclosed therein. For example, a cutting tube having teeth or having other cutting configurations such as a beveled edge can be utilized. Moreover, the instrument can be either disposable or reusable. Therefore, the above described should not be construed as limiting, but merely as exemplifications of preferred embodiments. The claims which follow identify embodiments of the invention additional to those described in detail above.

Claims

1. A surgical apparatus for cutting and storing sections of body tissue comprising:

   a housing having a handl assembly (12);
   an elongated outer tub (14) extending from the handl ass mbly;

a cutting tub (16) position d within the outer tube and movabl in response to actuation of th handle assembly betwe n a retracted position and a distal position to cut body tissu , the cutting tub having a chamber (86) formed therein for storing th cut tissu sections; and

characterized by:

a plug assembly (92) mounted on a proximal end of the cutting tube and being removable therefrom to access the cut tissue sections.

2. The apparatus of claim 1, wherein the plug assembly comprises a retaining member (90) and at least one ear (94) extending from the retaining member and engagable with a slot (96) formed in the cutting tube.

3. The apparatus of claim 1, wherein the plug assembly includes a plug (99) and a retaining member for retaining the plug on the cutting tube, wherein the plug is removable only when the cutting tube is removed from the outer tube.

4. The apparatus of claims 2 or 3, wherein the retaining member is removable from the cutting tube in order to remove the plug, the retaining member being accessible only when the cutting tube is removed from the outer tube.

5. Apparatus as claimed in any one of the preceding claims, and further including

an anvil (66) positioned at a distal end of the outer tube and configured for forcing each cut tissue section proximally into the chamber of the cutting tube as the cutting tube is advanced to cut the body tissue.

6. The apparatus of claim 5, wherein the outer tube has a window at a distal end to receive body tissue and wherein the anvil is positioned distally of the window in the outer tube.

7. The apparatus of any of the preceding claims, further comprising a release lever engagable with the handle assembly for releasing the cutting tube.

8. The apparatus of any of the preceding claims, wherein the handle assembly includes a trigger movable from a first position to a second position to advance the cutting tube, and further movable to a release position out of blocking engagement with the plug assembly to enable release of the cutting tube.

9. Apparatus as claimed in any on of th preceding claims, and further including

a rotation knob for rotating th elongated outr tub about its longitudinal axis; and

a locking memb r ngagabl with th rotation knob to prev nt rotation of th rotating knob.

10. The apparatus of claim 9, wherein the locking member is movable from a first position to prevent rotation of the knob and a second position to allow rotation of the knob, the locking member being spring biased to the first position.

11. Apparatus as claimed in claim 8, as dependent on claim 7, wherein the release lever is engagable with the trigger and movable from a blocking position to a release position to release the trigger to allow the cutting tube to be removed from the elongated body portion.

12. A surgical apparatus of claim 10, wherein the release lever has a shank mounted to the handle assembly and the trigger includes a notch blocked by the shank when the lever is in the blocking position.

13. A surgical apparatus of claim 12, wherein the release lever is pivotably mounted to the handle assembly and is spring biased to the release position and wherein movement of the release lever to the release position enables the trigger to pivot to a release position.

14. The apparatus of any of the preceding claims, wherein the cutting tube is removably mounted in the outer tube.

15. The apparatus of claim 5, wherein the anvil (66) includes a tissue engaging surface (68) oriented at an oblique angle relative to a longitudinal axis of the outer tube (14).

16. The apparatus of claim 15, wherein the outer tube (14) has an opening (61) in an outer wall portion thereof defining a window for reception of the body tissue, the anvil (66) being disposed distal of the window (61).

17. The apparatus of claim 9, wherein the locking member (22) is spring biased to the position in which it prevents rotation of the rotation knob.

18. The apparatus of claim 8, wherein the trigger (40) is further adapted for movement to a release position to fully release the cutting tube (16) and permit removal of the cutting tube (16) from the outer tube (14).

19. The apparatus of any on of the preceding claims, wherein th plug assembly (92) is dim nsion d such that a grasping end portion (98) of th plug

assembly (92) extends beyond the housing (12) when the trigger is in the release position thereof.

Patentansprüche

1. Eine chirurgische Vorrichtung zum Schneiden und Lagern von Körpergewebeteilen, umfassend:

   ein Gehäuse mit einer Griffeinheit (12);

   ein sich von der Griffeinheit erstreckendes längliches Außenrohr;

   ein Schneidrohr (16), das innerhalb des Außenrohres positioniert und auf die Betätigung der Griffeinheit hin zwischen einer zurückgezogenen Position und einer distalen Position bewegbar ist, um Körpergewebe zu schneiden, wobei das Schneidrohr eine darin gebildete Kammer (86) zum Lagern der geschnittenen Gewebeteile besitzt, **gekennzeichnet durch**:

   eine Steckereinheit (92), die an einem proximalen Ende des Schneidrohres befestigt und hiervon abnehmbar ist, um Zugang zu den geschnittenen Gewebeteilen zu schaffen.

2. Vorrichtung nach Anspruch 1, wobei die Steckereinheit ein Halteelement (90) und zumindest eine Erhebung (94), die sich von dem Halteelement erstreckt und mit einem in dem Schneidrohr gebildeten Schlitz (96) in Eingriff bringbar ist, aufweist.

3. Vorrichtung nach Anspruch 1, wobei die Steckereinheit einen Stecker (99) und ein Halteelement zum Halten des Steckers auf dem Schneidrohr umfasst, und wobei der Stecker nur dann abnehmbar ist, wenn das Schneidrohr von dem Außenrohr abgenommen ist.

4. Vorrichtung nach Anspruch 2 oder 3, wobei das Halteelement von dem Schneidrohr abnehmbar ist, um den Stecker abzunehmen, und wobei Zugang zum Halteelement nur dann möglich ist, wenn das Schneidrohr von dem Außenrohr abgenommen ist.

5. Vorrichtung nach einem der vorhergehenden Ansprüche, des weiteren umfassend
   einen Amboss (66), der an einem distalen Ende des Außenrohres positioniert und zum Bewegen jedes geschnittenen Gewebeteiles in proximaler Richtung in die Kammer des Schneidrohres konfiguriert ist, wenn das Schneidrohr bewegt wird, um Körpergewebe zu schneiden.

6. Vorrichtung nach Anspruch 5, wobei das Außenrohr an einem distalen Ende ein Fenster besitzt, um Körpergewebe aufzunehmen, und wobei der Amboss in distaler Richtung von dem Fenster in das Außenrohr positioniert ist.

7. Vorrichtung nach einem der vorhergehenden Ansprüche, des weiteren umfassend einen Freigabehebel, der mit der Griffeinheit in Eingriff bringbar ist zum Freigeben des Schneidrohres.

8. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Griffeinheit einen Trigger umfasst, der von einer ersten Position in eine zweite Position bewegbar ist, um das Schneidrohr zu bewegen, und weiter in eine Freigabeposition aus dem Blockiereingriff mit der Steckereinheit bewegbar ist, um ein Freigeben des Schneidrohres zu ermöglichen.

9. Vorrichtung nach einem der vorhergehenden Ansprüche, des weiteren umfassend
   einen Drehknopf zum Drehen des länglichen Außenrohres um seine Längsachse; und
   ein Arretierelement, das mit dem Drehknopf in Eingriff bringbar ist, um eine Drehung des Drehknopfes zu verhindern.

10. Vorrichtung nach Anspruch 9, wobei das Arretierelement von einer ersten Position, um eine Drehung des Knopfes zu verhindern, in eine zweite Position, um eine Drehung des Knopfes zu ermöglichen, bewegbar ist, und wobei das Arretierelement in die erste Position federvorgespannt ist.

11. Vorrichtung nach Anspruch 8, der abhängig vom Anspruch 7 ist, wobei der Freigabehebel mit dem Trigger in Eingriff bringbar ist und von einer Blockierposition in eine Freigabeposition bewegbar ist, um den Trigger freizugeben und um so ein Abnehmen des Schneidrohres von dem länglichen Körperabschnitt zu ermöglichen.

12. Chirurgische Vorrichtung nach Anspruch 10, wobei der Freigabehebel einen Schaft besitzt, der an der Griffeinheit befestigt ist, und der Trigger eine Kerbe umfasst, die durch den Schaft blockiert wird, wenn der Hebel sich in der Blockierposition befindet.

13. Chirurgische Vorrichtung nach Anspruch 12, wobei der Freigabehebel drehbar an der Griffeinheit befestigt und in die Freigabeposition federvorgespannt ist, und wobei eine Bewegung des Freigabehebels in die Freigabeposition eine Drehung des Triggers in eine Freigabeposition ermöglicht.

14. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei das Schneidrohr auf abnehmbare Weise in dem Außenrohr befestigt ist.

15. Vorrichtung nach Anspruch 5, wobei der Amboss (66) eine Greifflächenoberfläche (68) umfasst, die relativ zu einer Längsachse des Außenrohres (14) schräg angeordnet ist.

16. Vorrichtung nach Anspruch 15, wobei das Außenrohr (14) eine Öffnung (61) in ihrem Außenwandabschnitt besitzt, die ein Fenster zur Aufnahme des Körpergewebes bestimmt, und wobei der Amboss (66) distal von dem Fenster (61) angeordnet ist.

17. Vorrichtung nach Anspruch 9, wobei das Arretierelement (22) zu der Position federvorgespannt ist, in der es eine Drehung des Drehknopfes verhindert.

18. Vorrichtung nach Anspruch 8, wobei der Trigger (40) für die Bewegung in eine Freigabeposition ausgebildet ist, um so vollständig das Schneidrohr (16) freizugeben und ein Abnehmen des Schneidrohres (16) von dem Außenrohr (14) zu ermöglichen.

19. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Steckereinheit (92) derart bemessen ist, dass ein Griffendabschnitt (98) der Steckereinheit (92) sich über das Gehäuse (12) hinaus erstreckt, wenn sich der Trigger in der Freigabeposition befindet.

Revendications

1. Instrument chirurgical pour couper et stocker des sections de tissu corporel comprenant :

   un boîtier comportant un ensemble de poignées (12);
   un tube externe oblong (14) s'étendant à partir de l'ensemble de poignées;
   un tube de coupe (16) positionné dans le tube externe et déplaçable en réponse à l'actionnement de l'ensemble de poignées entre une position rétractée et une position distale pour couper le tissu corporel, le tube de coupe présentant une chambre (86) formée dans celui-ci pour stocker les sections de tissu coupées; et

   caractérisé par :

   un ensemble formant bouchon (92) installé sur une extrémité proximale du tube de coupe et retirable de celui-ci pour accéder aux sections de tissu coupées.

2. Instrument, selon la revendication 1, où l'ensemble formant bouchon comprend un élément de retenu (90) et au moins une oreille (94) s'étendant à partir de l'élément de retenue et apte à s'engager dans une fente (96) ménagée dans le tube de coupe.

3. Instrument selon la revendication 1, où l'ensemble formant bouchon comporte un bouchon (99) et un élément de retenue pour retenir le bouchon sur le tube de coupe, où le bouchon est retirable seulement lorsque le tube de coupe est retiré du tube externe.

4. Instrument selon les revendications 2 ou 3, où l'élément de retenue peut être retiré du tube de coupe pour retirer le bouchon, l'élément de retenue étant accessible seulement lorsque le tube de coupe est retiré du tube externe.

5. Instrument selon l'une des revendications précédentes, et comportant en outre une enclume (66) positionnée à une extrémité distale du tube externe et configurée pour forcer chaque section de tissu coupée proximalement dans la chambre du tube de coupe au fur et à mesure que le tube de coupe est avancé pour couper le tissu corporel.

6. Instrument selon la revendication 5, où le tube externe possède une fenêtre à une extrémité distale pour recevoir le tissu corporel, et où l'enclume est positionnée distalement de la fenêtre dans le tube externe.

7. Instrument selon l'une des revendications précédentes, comprenant en outre un levier de relâchement pouvant être mis en prise avec l'ensemble de poignées pour libérer le tube de coupe.

8. Instrument selon l'une des revendications précédentes, où l'ensemble de poignées comporte une gâchette déplaçable d'une première position à une seconde position pour faire avancer le tube de coupe et déplaçable en outre à une position de relâchement hors prise de verrouillage avec l'ensemble formant bouchon pour permettre la libération du tube de coupe.

9. Instrument selon l'une des revendications précédentes, et comportant en outre
   un bouton de rotation pour faire tourner le tube externe oblong autour de son axe longitudinal; et
   un élément de verrouillage pouvant être mis en prise avec le bouton de rotation pour empêcher la rotation du bouton de rotation.

10. Instrument selon la revendication 9, où l'élément de verrouillage est déplaçable d'une première position, pour empêcher la. rotation du bouton à une seconde position pour permettre la rotation du bouton, l'élément de verrouillage étant sollicité par ressort à la première position.

11. Instrument selon la revendication 8, dépendant de la revendication 7, où le levier de relâchement peut

être mis en prise avec la gâchette et est déplaçable d'une position de verrouillage à une position de relâchement pour relâcher la gâchette pour permettre que le tube de coupe soit retiré de la portion de corps oblongue.

12. Instrument chirurgical selon la revendication 10, où le levier de relâchement possède un fût monté sur l'ensemble de poignées, et la gâchette comporte une encoche bloquée par le fût lorsque le levier se trouve dans la position de blocage.

13. Instrument chirurgical selon la revendication 12, où le levier de relâchement est monté d'une manière pivotante sur l'ensemble de poignées et est sollicité par ressort à la position de relâchement, et où un déplacement du levier de relâchement à la position de relâchement permet à la gâchette de pivoter à une position de relâchement.

14. Instrument selon l'une des revendications précédentes, où le tube de coupe est installé amoviblement dans le tube externe.

15. Instrument selon la revendication 5, où l'enclume (66) comporte une surface de mise en prise avec le tissu (68) orientée selon un angle oblique relativement à un axe longitudinal du tube externe (14).

16. Instrument selon la revendication 15, où le tube externe (14) possède une ouverture (61) dans sa portion de paroi extérieure définissant une fenêtre pour la réception du tissu corporel, l'enclume (66) étant disposée distalement de la fenêtre (61).

17. Instrument selon la revendication 9, où l'élément de verrouillage (22) est sollicité par ressort à la position dans laquelle il empêche la rotation du bouton de rotation.

18. Instrument selon la revendication 8, où la gâchette (40) est en outre conçue pour un mouvement à une position de relâchement pour relâcher entièrement le tube de coupe (16) et pour permettre le retrait du tube de coupe (16) du tube externe (14).

19. Instrument selon l'une des revendications précédentes, où l'ensemble formant bouchon (92) est dimensionné de façon qu'une portion d'extrémité de préhension (98) de l'ensemble formant bouchon (92) s'étende au-delà du boîtier (12) lorsque la gâchette se trouve dans sa position de relâchement.

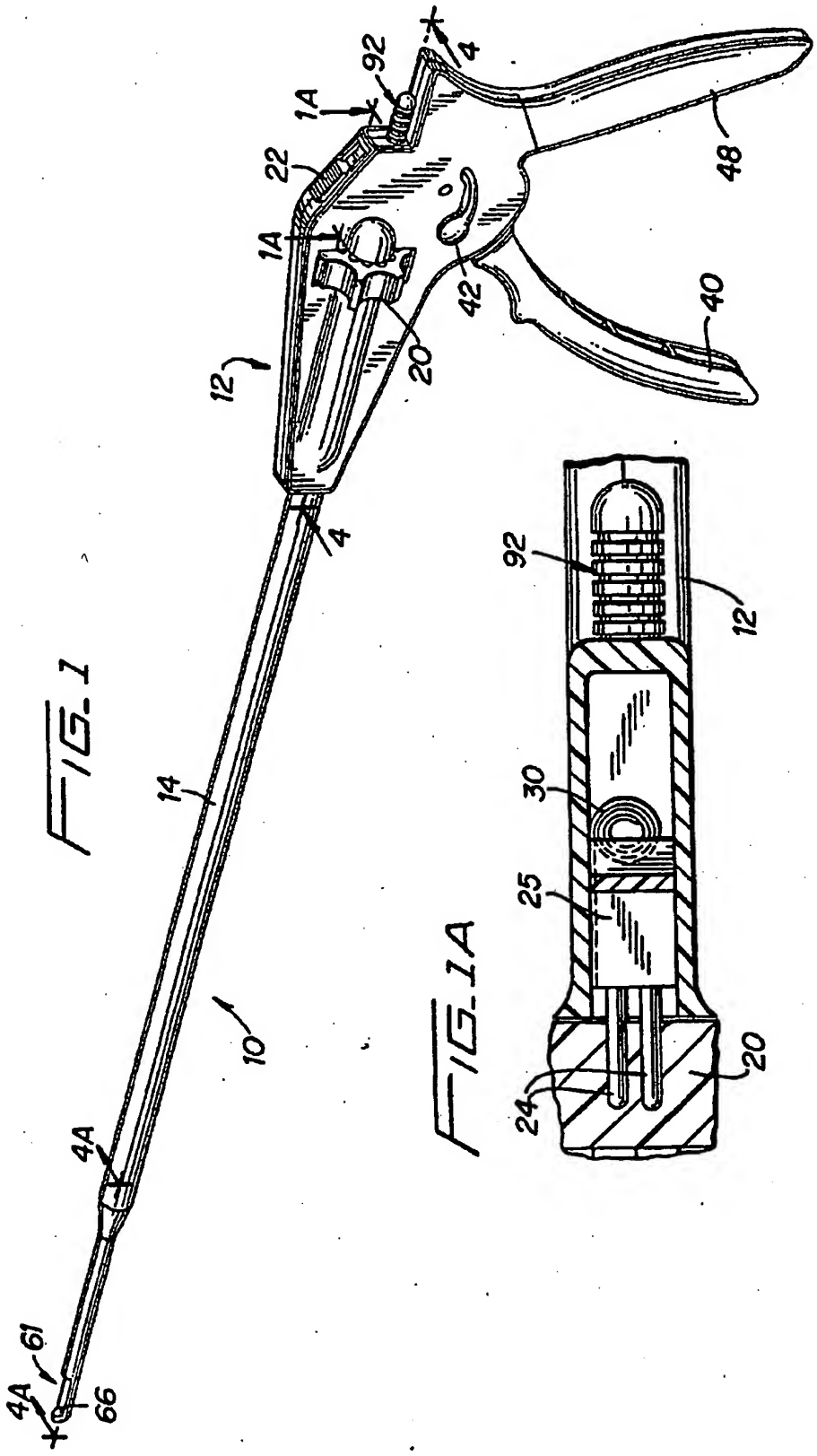

FIG. 1

FIG. 1A

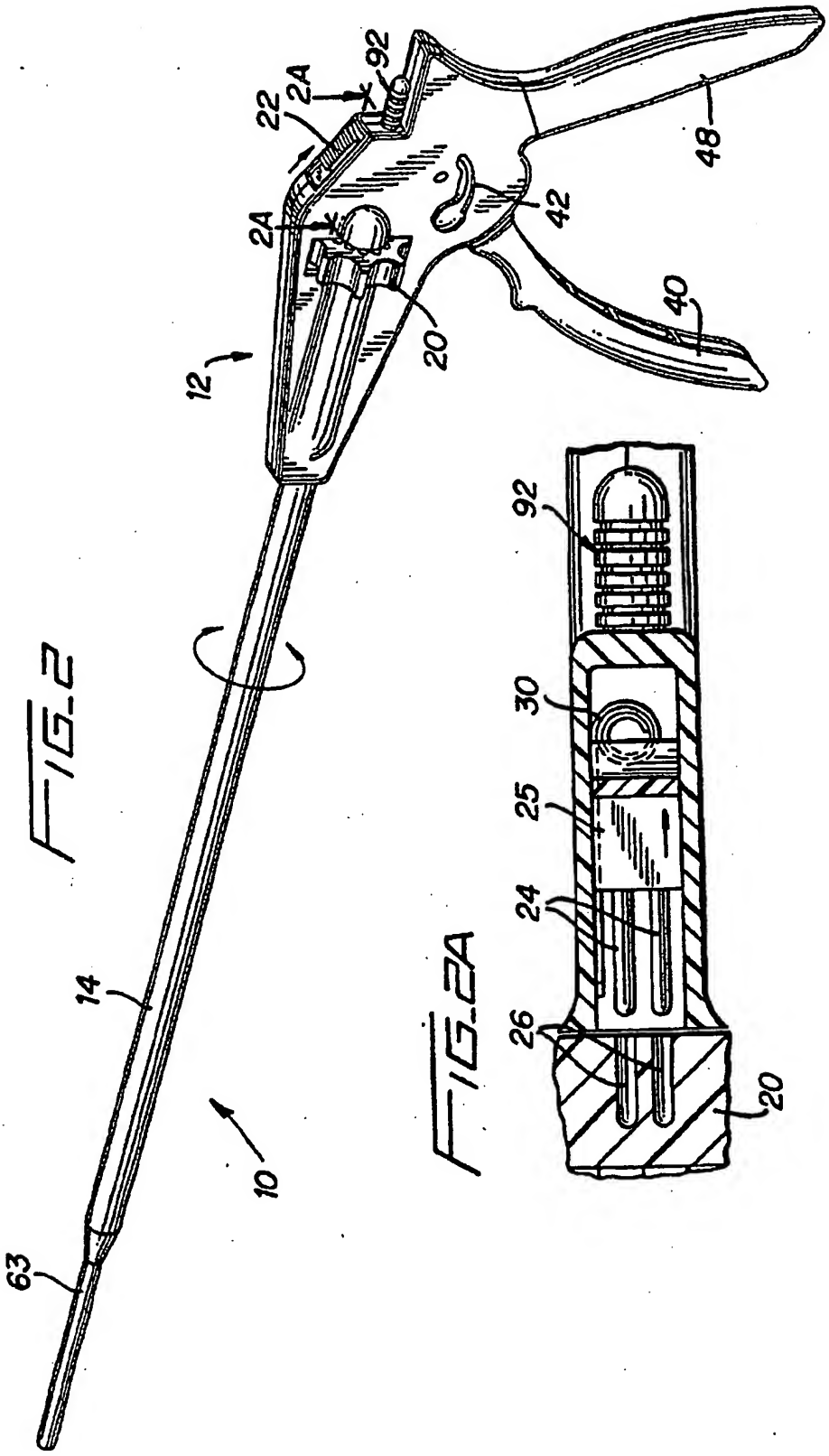

FIG. 2

FIG. 2A

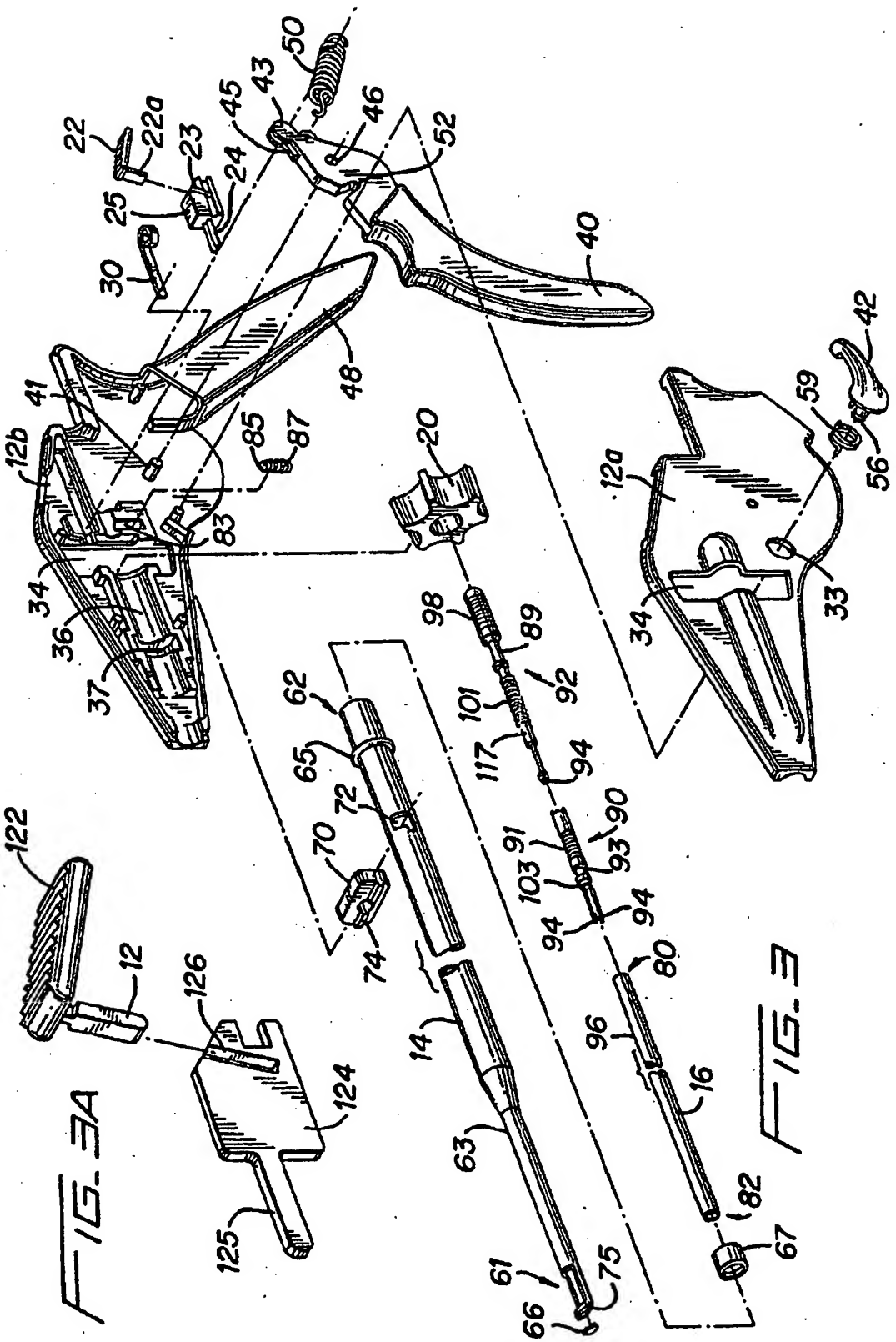
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FIG. 3A

FIG. 3

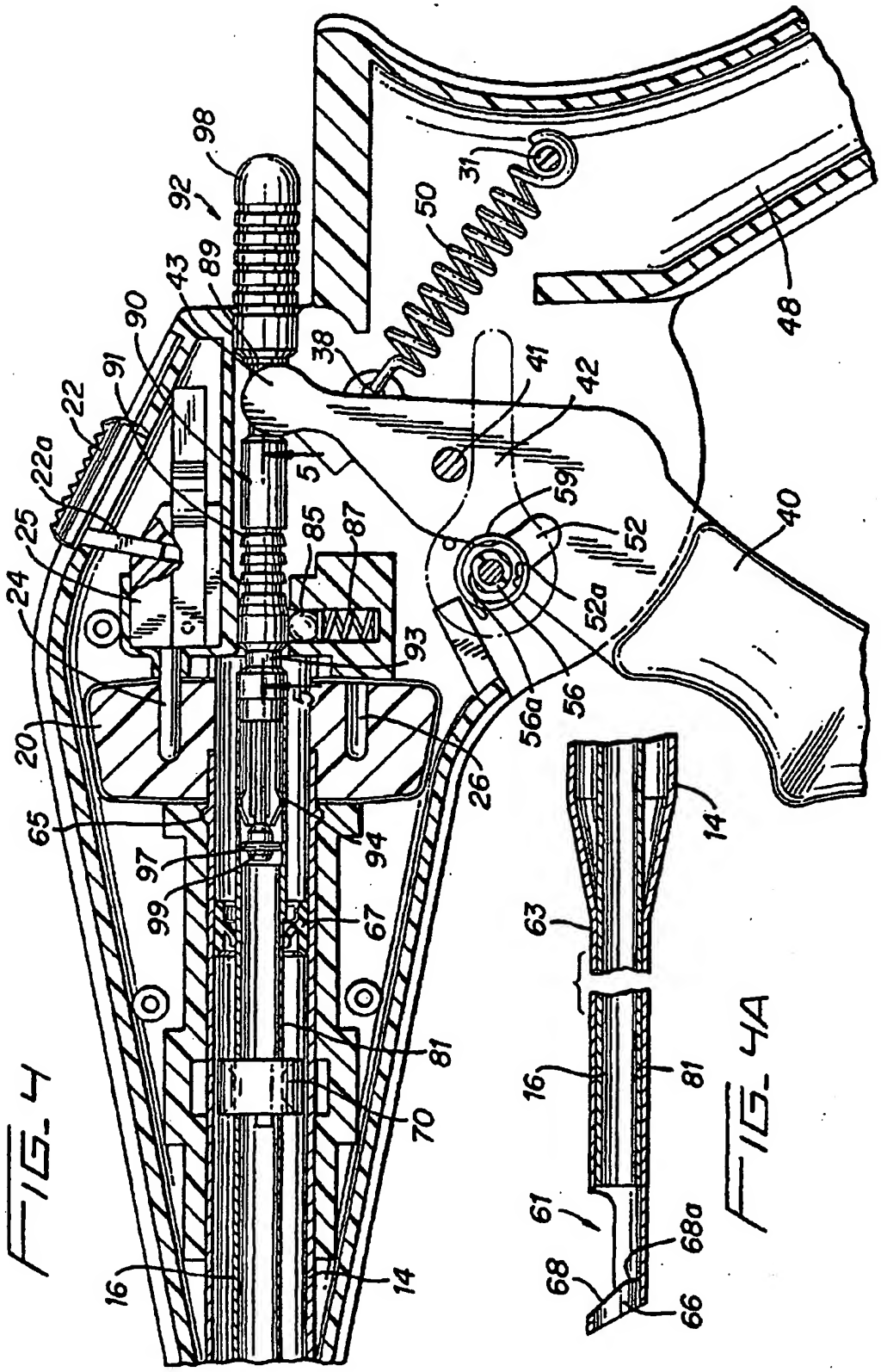
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FIG. 4

FIG. 4A

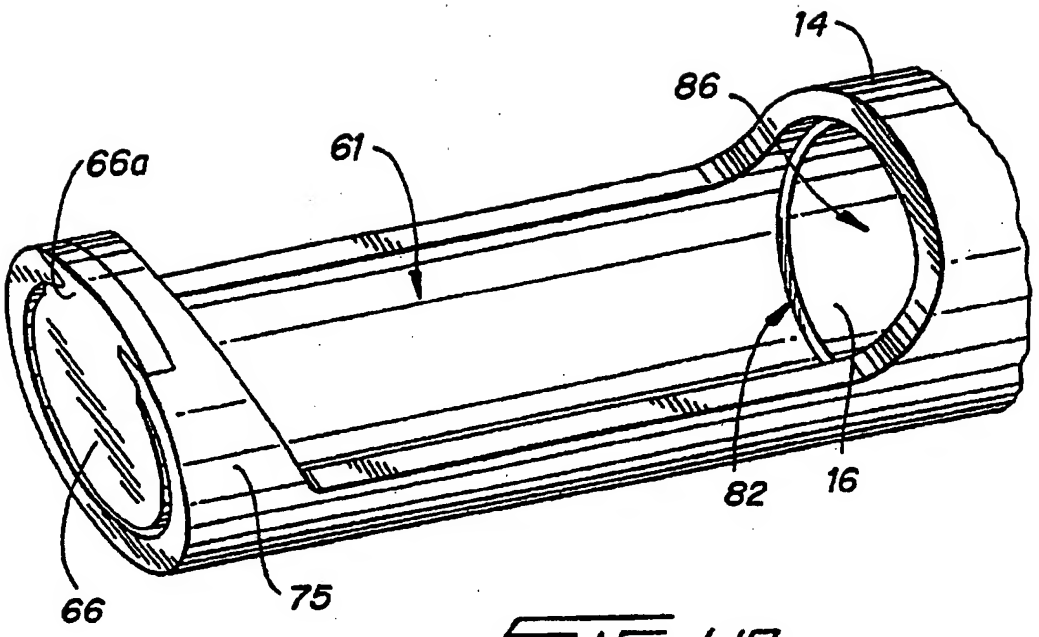

FIG. 4B

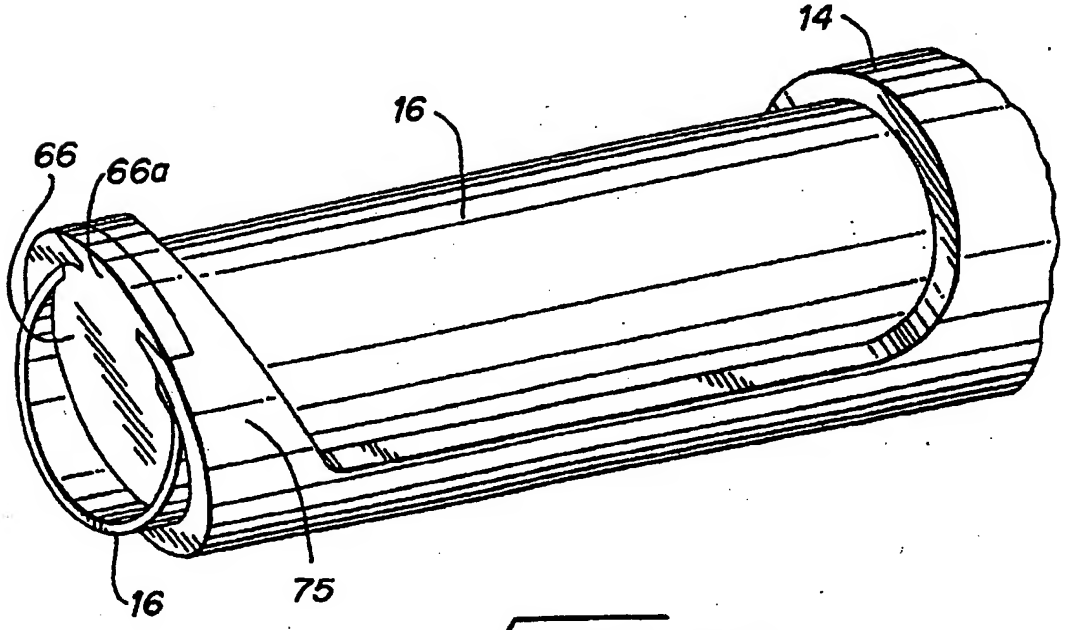

FIG. 6B

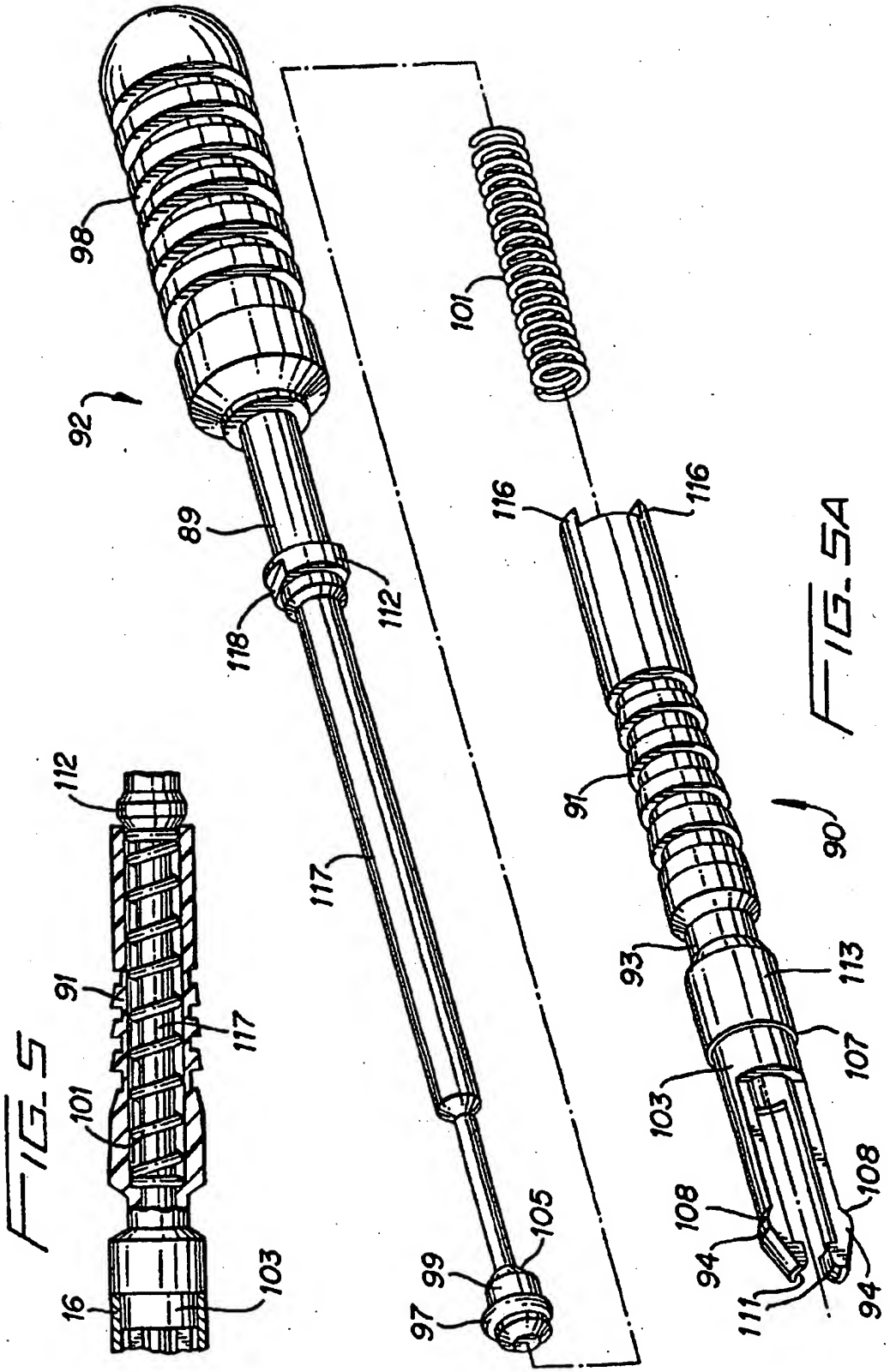
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FIG_5A

FIG_5

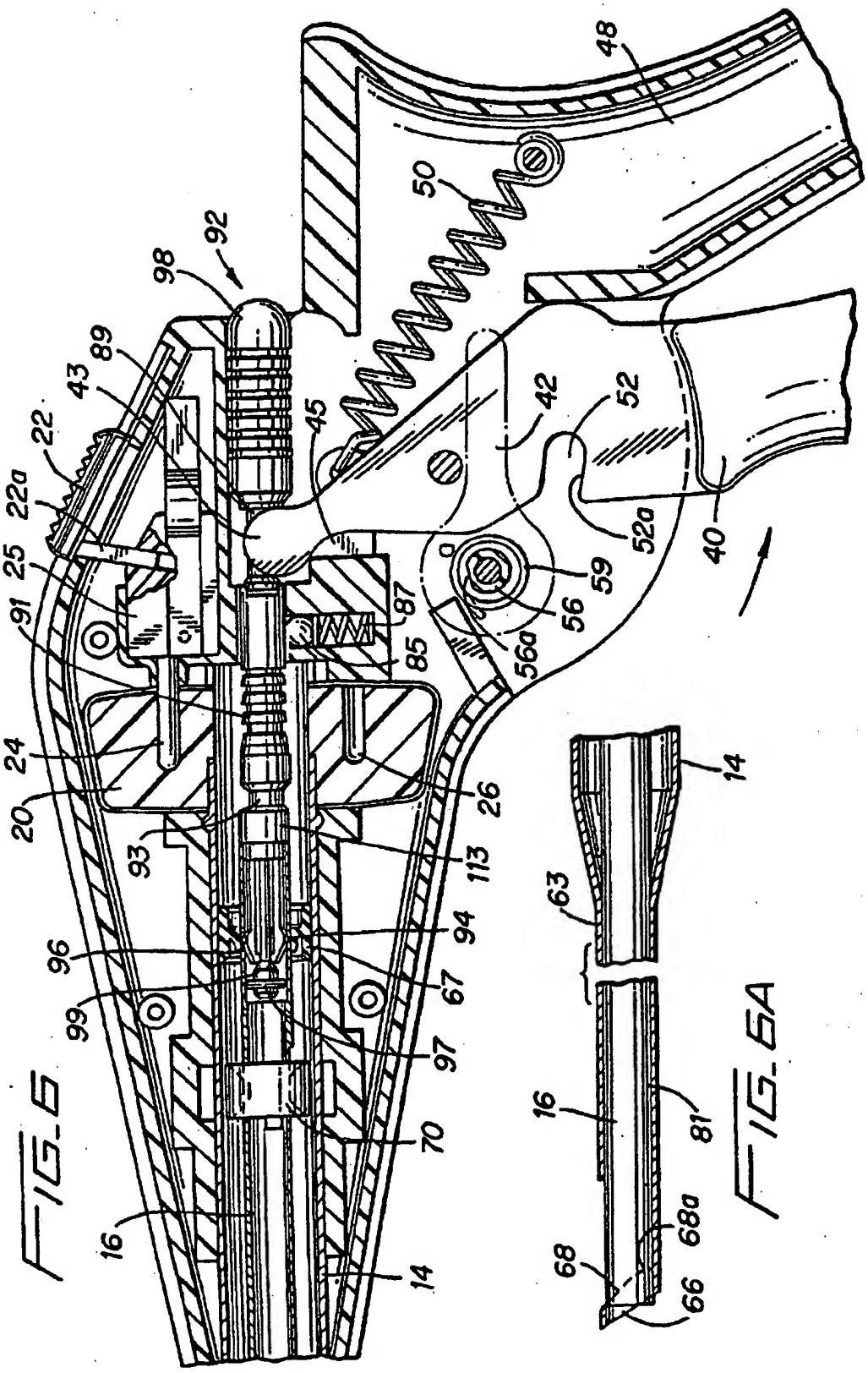
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FIG_6

FIG_6A

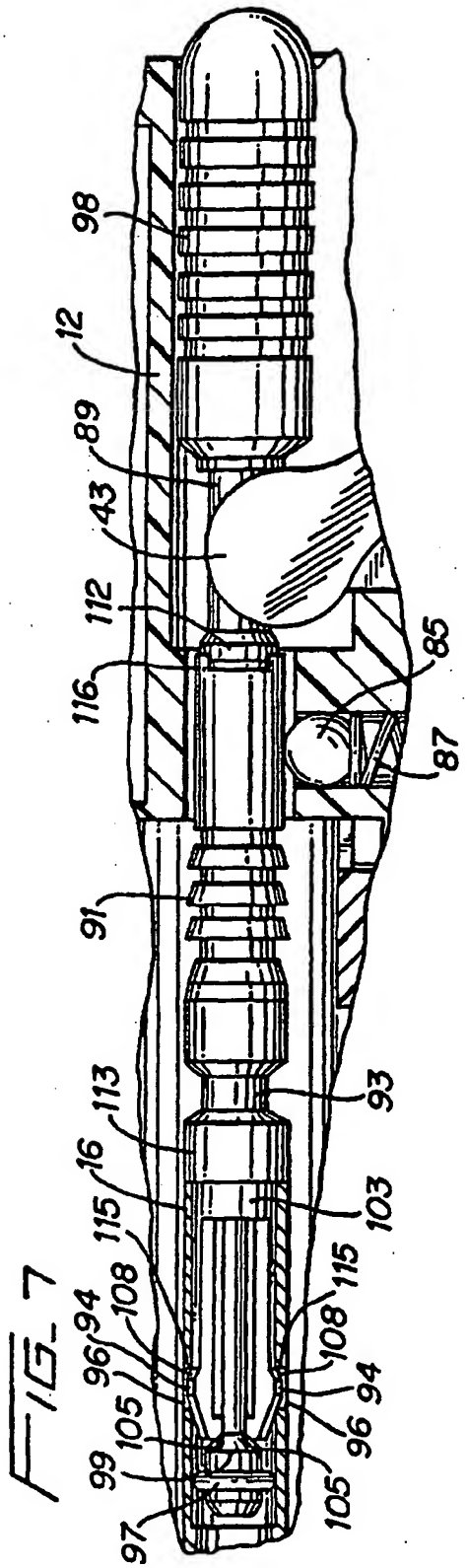
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FIG. 7

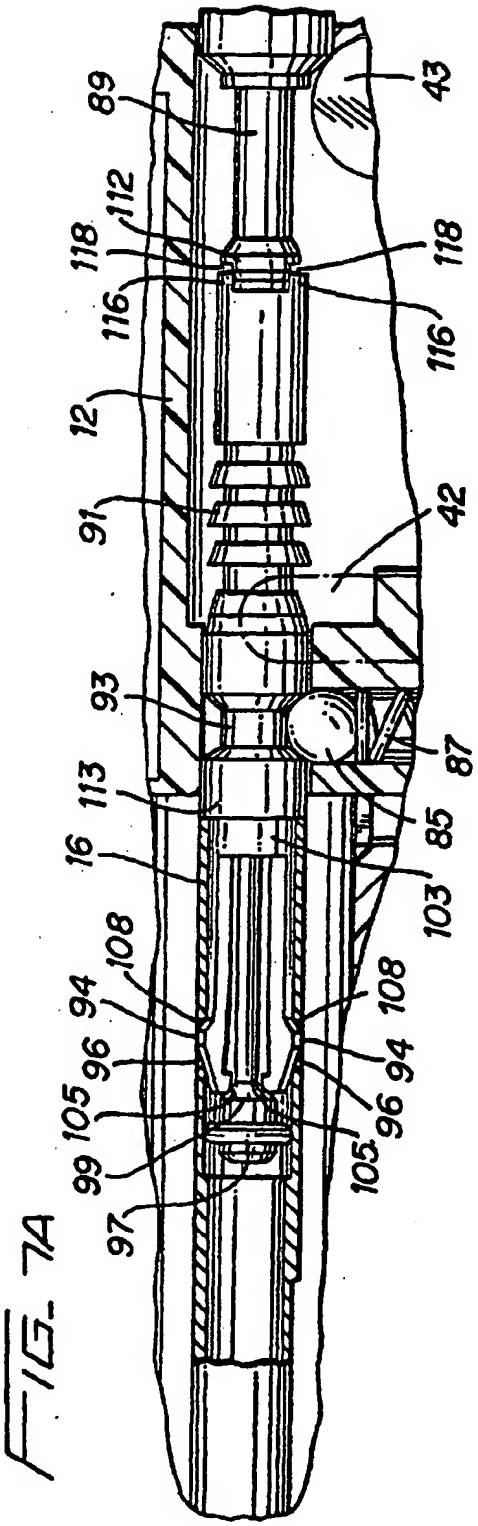
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FIG. 7A

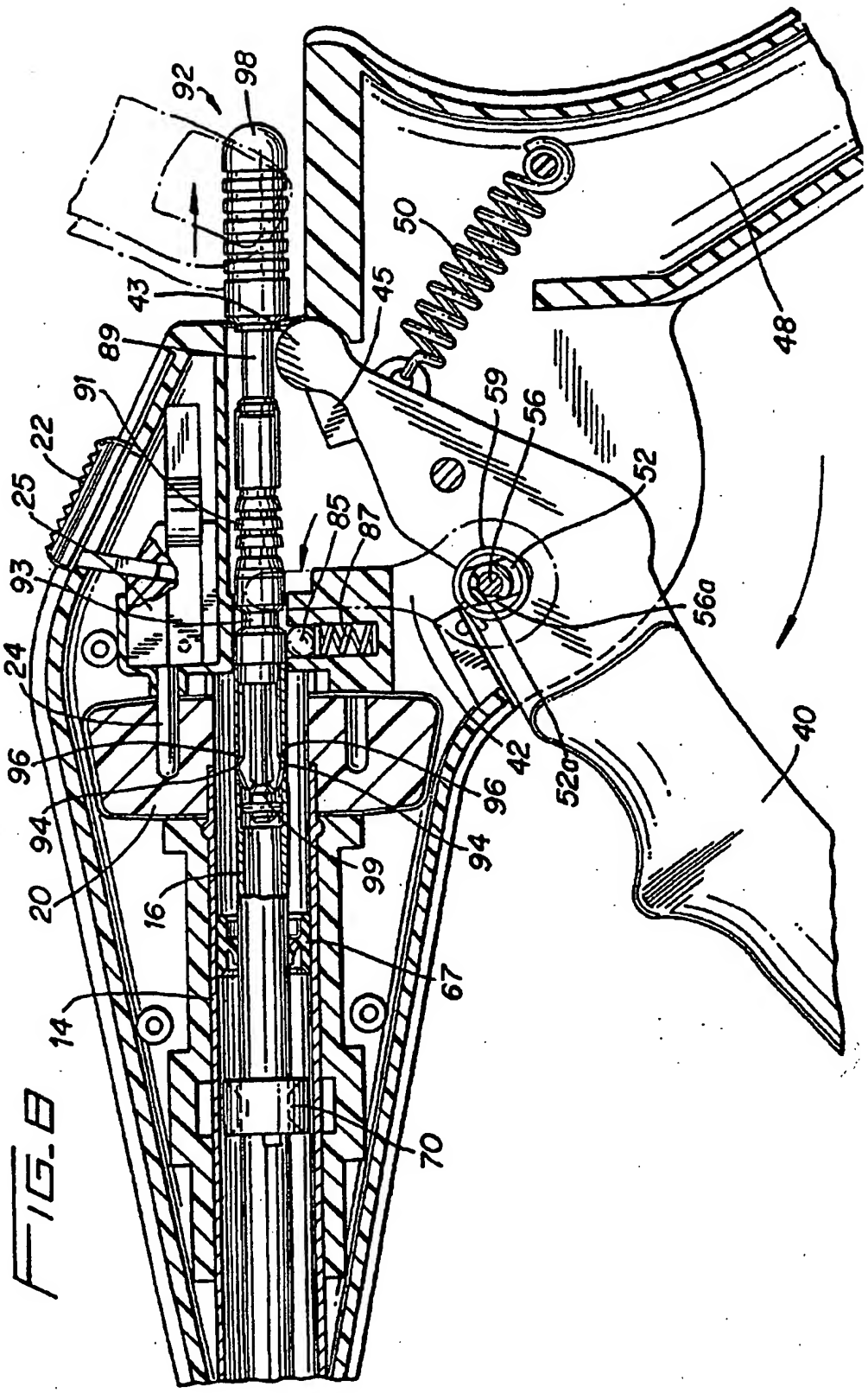
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FIG. 8

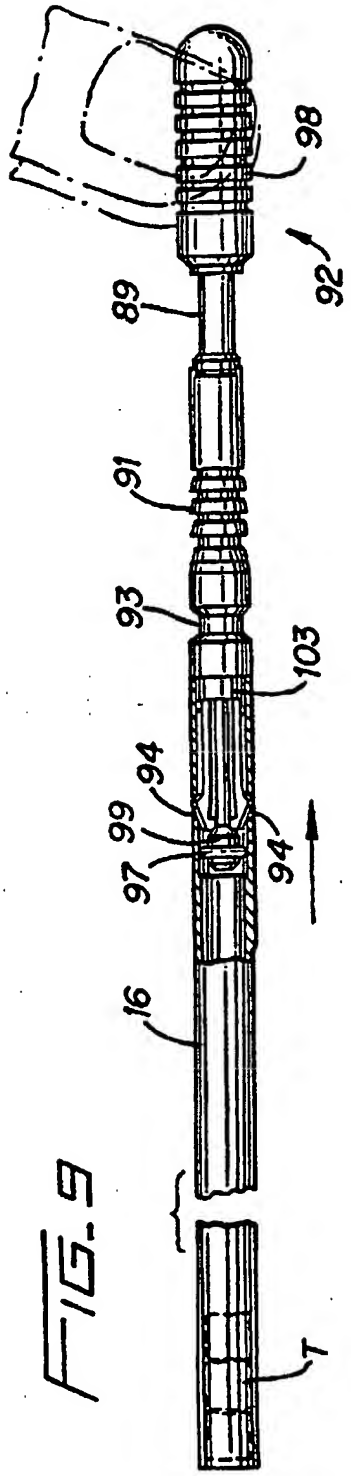

FIG_9

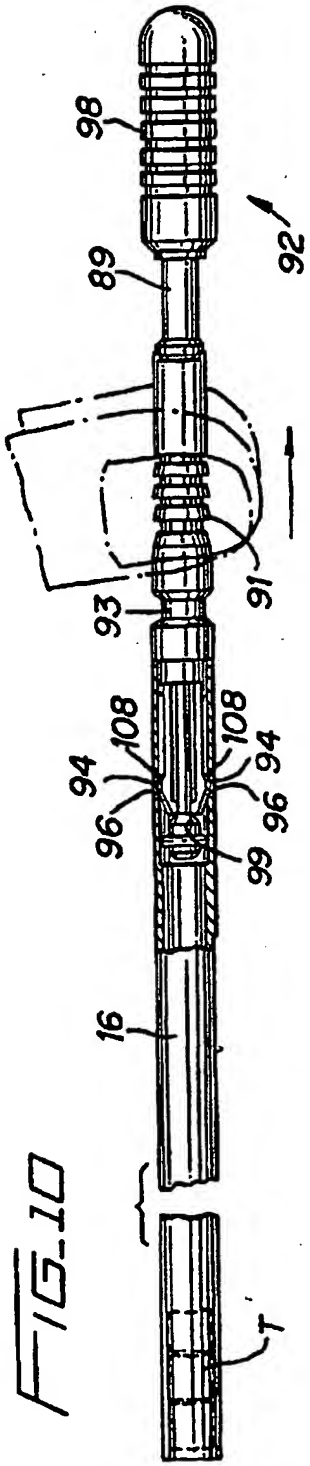

FIG_10

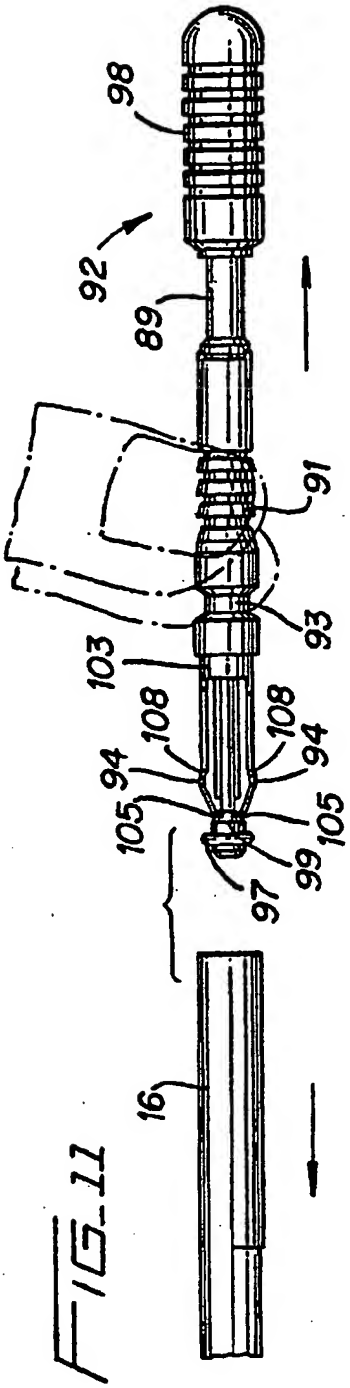

FIG_11

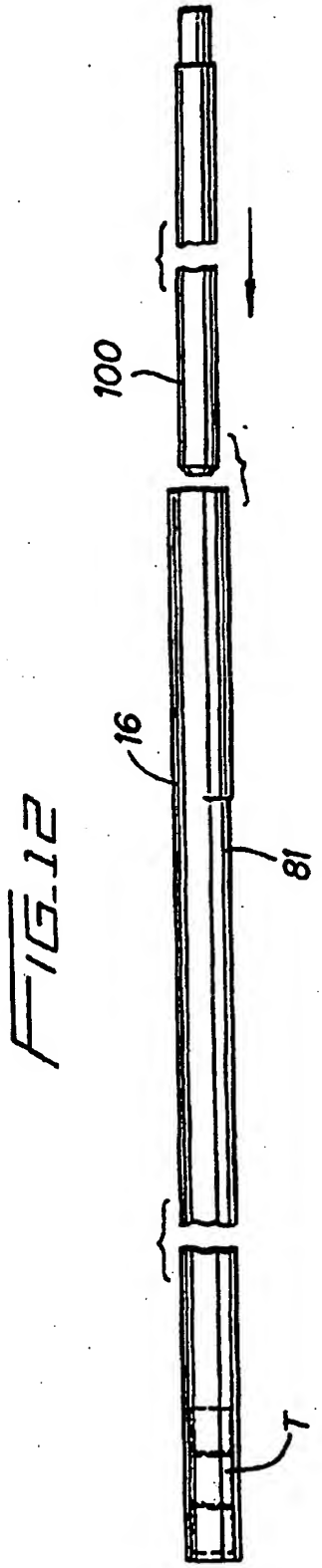

FIG_12

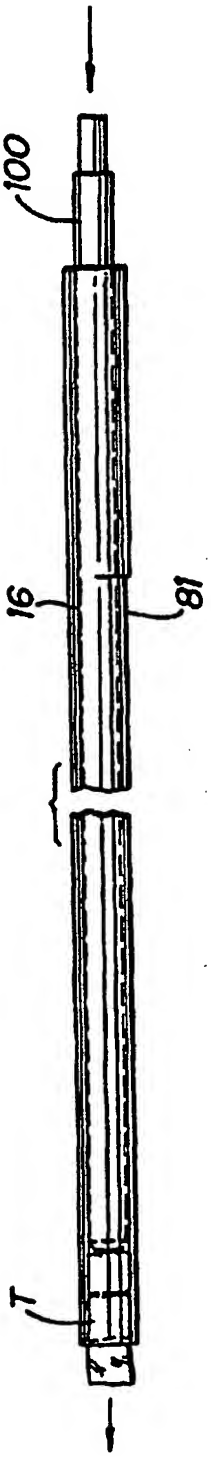

FIG_13